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DETECTION OF ANTIBIOTICS SENSITIVITY OF SALMONELLA TYPHI IN WASIT PROVINCE OF IRAQ

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Abstract

Background: *Salmonella typhi* was food born infectious bacterial agent can transfer to human by water or food contaminated and causing disease in both gender and also infected healthy and immunocompromised patients enteric fever stay to remain as a major public health problem. Objective: current study was design to isolate *Salmonella typhi* from blood and them detecting its by using different biochemical tests like API20E, and them tested isolated pathogen to different antibiotics in which commonly used in treatment through antibiotic sensitivity test. Methods: in this study a total of 800 blood samples were collected randomly from patients with different ages and gender suffered from clinical symptoms of typhoid fever in which attended to al-karma teaching hospital in alKut-Waist government/ Iraq, after diagnosis of them appeared that 72 patients (9%) of them infected with *Salmonella typhi*, them used appropriate statistical methods to analysis many results, after that detected of antimicrobial activity of these pathogenic bacteria by using different antibiotics that commonly used in treatment of these disease, the results of this test show that all isolates appeared sensitive to imipenem followed by ciprofloxacin (95.8%) them Ceftriaxone(93.7%), Co-trimoxazole(83.2%), Chlormophenicol (71.5%), Ampicillin(70.51%) and last one was nalidixic acid (68.5%). Aims: this study was design to detect ratio of infection with this pathogen in Waist province in Iraq and also discovered the most suitable antibiotics in treatment of its.

Keywords: Enteric Fever**,** *Salmonella Typhi*, Iraq, Multidrugs Resistance.

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Introduction

Typhoid fever, was the worldwide problem in which 80% from population infections found in Asia countries and the others cases found in Africa and Latin America[1]. Health care defects, poor sterilization and disinfecting methods, these factors combined together to make typhoid fever still remain as a major public health problems in most countries such as Iraq[2]. *Salmonella typhi*, *S. paratyphi* and *S. enteric* are the most common cause of enteric fever in India, especially during summer(2). *Salmonella typhi* was Gram-negative enteric bacillus retained to family Enterobacteriaceae, It characterized by many criteria like ability to motile, lived in facultative anaerobic condition and don't have animal reservoir also in most cases it was susceptible to various antibiotics[3]. some time Complicated treatment to typhoid fever may be coming from antimicrobial drug resistance to treatment especially in case of multidrugs resistance to use of chlormophenicol, ampicillin and co-trimoxazole[4-6]. Also for more advanced way to diagnosed *S. typhi* was use of polymerase chain reaction technique(PCR) for further detection of these pathogen from blood sample patients[7]

1. Materials and Methods

1.1. Culture of bacteria

These study include 800 blood samples collected from patient suffered from clinical symptoms of typhoid fever attended al-karma teaching hospital in waist government/ al-Kut and also inpatients in period from February to December 2020, from these samples *S. typhi* was isolated from 72 samples from them.

After collected of these samples cultured it's on enriched media such blood agar media[8], them after overnight incubation at 37°C after that culture it's on MacConkey agar and Salmonella-Shigella agar media in which produced characteristic colonies and also Xylose-lysine desoxycholate (XLD) agar media, them farther identification by biochemical tests and other biochemical tests such as API20 for *S. typhi*.

1.2. Antimicrobial Susceptibility Testing

This test was done according to Kirby-Bauer disk diffusion depending to Clinical Laboratory Standards guidelines[9]. The antibiotics used in these study was common used in treatment of these pathogen such as ampicillin (10µg/disk), chlormophenicol (30µg/disk), co-trimoxazole (5µg/disk), ciprofloxacin (5µg/disk), ceftriaxone (5µg/disk), nalidixic acid (30µg/disk) and imipenem (10µg/disk).

2. Results and Discussions

2.1. Isolation results

Results of these study refers that 72 isolate of *S. typhi* out of 800 total blood samples, with incidence of occurrence 9% of suspected out and inpatients (Figure 1), these result was agree with results obtain with[2] in India in which found 7.6% and some other worldwide, but disagree with [10] in Iraq that obtain 23.7%.

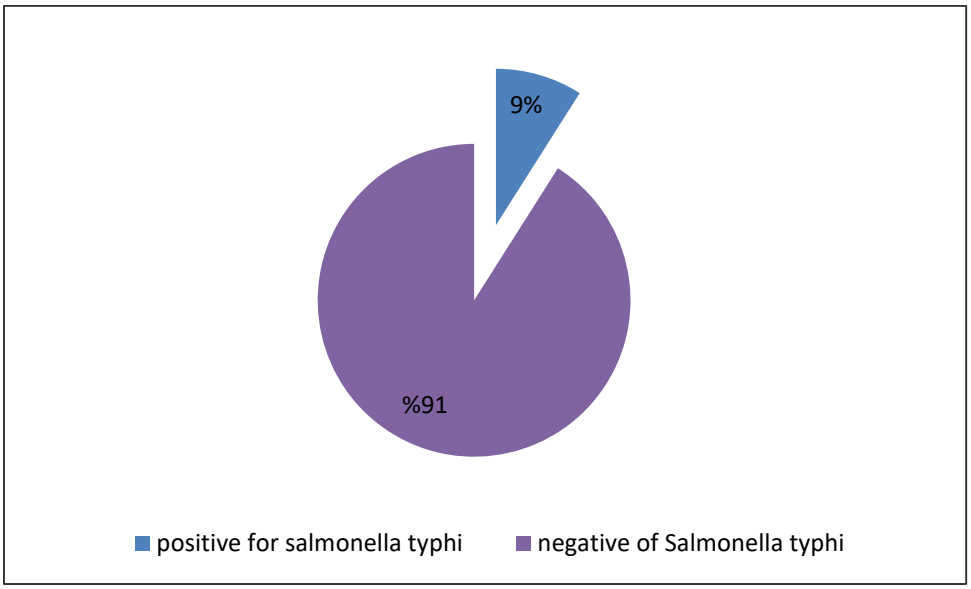
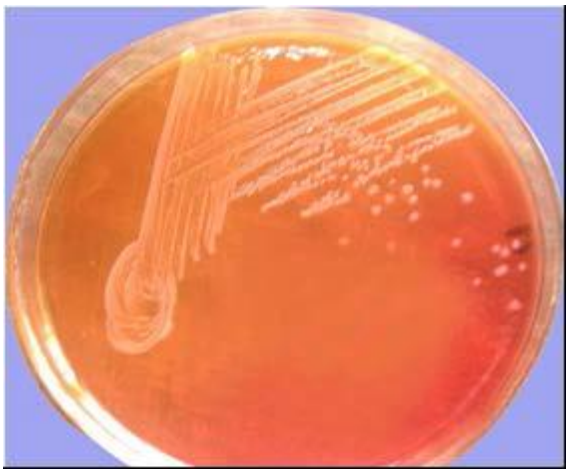


Figure1: Total numbers of blood samples, positive and negative isolates of *salmonella typhi*

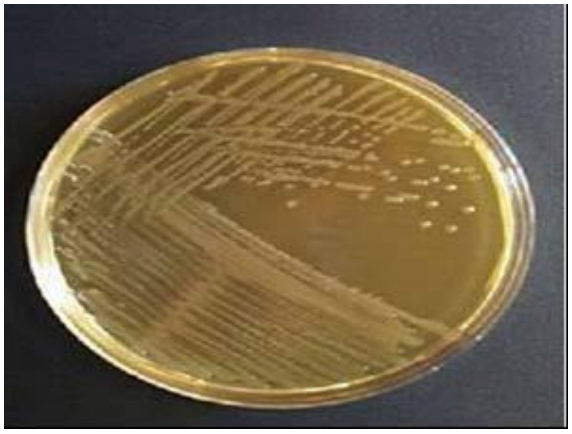
2.2. Culture results of bacteria after cultured it's on MacConkey agar, Salmonella-Shigella agar, blood agar media and Xylose-lysine desoxycholate

Pathogen show pale color after overnight incubation at 37°C on MacConkey agar media because it has no ability to ferment lactose but it gives colorless colony after cultured them on Salmonella-Shigella agar media, on other hand these bacteria grey to white colonies after cultured on blood agar media as appeared on Figure 2, also on Xylose-lysine desoxycholate (XLD) agar media gives red colony with black center as result of H2S production.

The sensitivity of this pathogen on blood agar was low due to decrease infectious dose of this bacteria for caused infection during first week of infection them sensitivity become high during development of symptoms[10]. *Salmonella typhi* may be found on patient blood stream on any stage of illness but mostly appeared on first 7 to 10 days of relapses [11].



(1)



(2)

(3)

Figure 2. (Morphological appearance of *Salmonella typhi* on MacConkey, Salmonella –Shigella and Blood agar culture media)

2.3. Biochemical test results for detection *Salmonella typhi*

The biochemical results was show in Table 1 and Figure 3 and also Table 2 in which clear the results of figure 3.

Biochemical test	Result	Biochemical test	Result
Catalase	-	Citrate utilization	-
Indole	+	Oxidase and urease productions	+
Methyl red	-	Production of H2S	+
Vogus-Proskawer	-		

(+) positive reaction, (-) negative reaction

Table 1. Biochemical results of *Salmonella typhi*

Figure 3. API20E results for detecting *Salmonella typhi*

Test	Result	Test	Result
Indole test	-	Production of H2S	+
Urease test	-	Utilization of Citrate	+
Acetone production	-	B-Galactosides	-
Tryptophan deaminase	-	Arginine dihydrolyase	+
Ferment of Glucose	+	Lysine decarboxylase	+
Liquefaction of Gelatin	-	Melibiose fermentation	+
Ferment of mannitol	+	Amygdalin fermentation	-
Ferment of inositol	+	Arabinose fermentation	+
Ferment of Rhamnose	+	Decarboxylase	+
Ferment of sorbitol	+	Ferment of sucrose	-

Table 2. Results of API20E for detecting *Salmonella typhi*

2.4. Antibiotics Sensitivity Test

Antimicrobial sensitivity test appeared that all isolates were sensitive to imipenem followed by ciprofloxacin (95.8%) them Ceftriaxone(93.7%),Co-trimoxazole(83.2%), Chlormophenicol (71.5%), Ampicillin and last one was nalidixic acid (68.5%) as show in Table 3.

Antibiotic name	**Dose weight (µg/disk)**	**Percentage of sensitivity %**
Imipenem	10µg/disk	100
Ciprofloxacin	5µg/disk	95.8
Ceftriaxone	5µg/disk	93.7
Co-trimoxazole	5µg/disk	83.2
Chlormophenicol	30µg/disk	71.5
Ampicillin	10µg/disk	70.51
Nalidixic acid	30µg/disk	68.5

Table 3: Antibiotic names with its weight dose and percentage of sensitivity

The antimicrobial data obtained in this study appeared that Imipenem has excellent action in treatment of these disease because they are not found any resistance against its by any *S. typhi* isolates, also highly resistance to nalidixic acid and low one seen against ciprofloxacin, also others antibiotic gave different ratio of resistance as shown in above table, these indicated failure of these drugs to respond against some *S. typhi* isolates[12-14].

3. Conclusion

The conclusion results showed that ratio of *Salmonella typhi* in which the causative agent of typhoid fever was (9%) from total blood samples collected also these study appeared that first line in treatment of *S. typhi* was Imipenem following with ciprofloxacin, and more antibiotic appeared resistance by this pathogen was Nalidixic acid for this case advance to exclude nalidixic acid from treatment diseases cause by this pathogen.

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